REMARKS

Prior to this communication, claims 14-22 and 30-62 are pending in the application. In the pending Office action, claims 14-22 and 30-62 are rejected. By this amendment, Applicant is amending claims 14, 17, 19-22, 30, 32-36, and 40; adding claims 63-72; and canceling claims 16 and 41-43. Reexamination and reconsideration of claims 14, 15, 17-22, 30-40, and 44-73 in view of the amendments and remarks contained herein are respectfully requested.

Claim 14, which now includes the subject matter of original claim 16, is repeated below for the Examiner's reference.

14. (Currently amended) A method of heating water stored in a water tank of a storage-type water heater comprising

a first electric-resistance heating element comprising a thermal surface disposed within an inner surface of the tank at a first location,

a second electric-resistance heating element comprising a thermal surface disposed within the inner surface of the tank at a second location disposed vertically above the first location, and

first and second temperature sensors associated with the first and second heating elements, respectively,

a third temperature sensor coupled to the tank at a third location disposed vertically between the first and second locations, the method comprising:

sensing a first temperature with the first temperature sensor;

sensing a second temperature with the second temperature sensor;

preventing power to the second heating element and controllably providing power to the first heating element if the first temperature is below a first set point, the second temperature is above a second set point, and zero or more other conditions exist;

preventing power to the first heating element and controllably providing power to the second heating element if the second temperature is below a second set point and zero or more other conditions exist;

preventing power to the first and second heating elements if the first and second temperatures are above the first and second set points, respectively, and zero or more other conditions exist; and

wherein the acts of preventing power to the second heating element and controllably providing power to the first heating element and preventing power to the first heating element and controllably providing power to the second heating element occur during normal operation, and wherein the method further comprises

sensing a third temperature with the third temperature sensor;

ceasing normal operation if the third temperature is below a third set point and zero or more other conditions exist; and

entering boost operation if the third temperature is below a third set point and zero or more other conditions exist.

Original claim 16 stood rejected under 35 U.S.C. § 102(a) as being anticipated by USPN 6,363,218 (Lowenstein). A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. M.P.E.P. § 2131. Applicant asserts the Lowenstein reference does not teach or suggest each and every claimed element as set forth in amended claim 14 (previous claim 16).

Claim 14 is directed a method of heating water stored in a water tank of a storage-type water heater comprising, among other things, first and second temperature sensors associated with first and second heating elements, respectively, and a third temperature sensor coupled to the tank at a third location disposed vertically between the first and second locations, the method comprising, among other things, ceasing normal operation if the third temperature (which is sensed by the third sensor) is below a third set point and zero or more other conditions exist, and entering boost operation if the third temperature is below a third set point and zero or more other conditions exist. The Lowenstein reference does not teach or suggest the just-recited text. Rather, the Lowenstein reference discloses first and second thermostats 18 and 19 associated with first and second heating elements 16 and 17, respectively. Col. 3, lines 35-44 and Figs. 1 and 2. However, there is no discussion within the Lowenstein reference of a third temperature sensor located between the first and second thermostats 18 and 19. At best, the Lowenstein reference discloses placing a temperature sensor in "the upper region" of the water tank 11, which Applicant asserts is the region above the thermostat 19. See col. 7, lines 35-45. Therefore, the Lowenstein reference does not teach or suggest claim 14 and, in fact, teaches away from claim 14. Accordingly, claim 14 is allowable.

Applicant amended claims 17 and 19-22 to change the dependency of these claims.

Claims 15, 17-22, and 44-53 depend, either directly or indirectly, from claim 14, and consequently, include patentable subject matter for the reasons set forth above with respect to claim 14. Accordingly, claims 15, 17-22, and 44-53 are allowable. In addition, Applicant asserts claims 15, 17-22, and 44-53 include additional features that are believed to be allowable when combined with claim 14.

Claim 30, which includes the subject matter of claim 43, is repeated below for the Examiner's reference.

> 30. A method of controlling a storage-type water heater comprising
> a water tank comprising an inner surface
> a first electric-resistance heating element comprising a thermal surface disposed within the inner surface at a first location,
> a second electric-resistance heating element comprising a thermal surface disposed within the inner surface at a second location, and
> a control system to operate the first and second heating elements, wherein the control system comprises a current sensor associated with the first heating element, the method comprising:
> controllably providing power to the first and second heating elements to heat water stored in the water tank;
> detecting the failure of one of the first and second heating elements;
> if detecting the failure of one of the first and second heating elements and zero or more other conditions exist,
> preventing power to the failed heating element; and
> controllably providing power to the non-failed heating element to heat water stored in the water tank;
> wherein the act of controllably providing power to the first and second heating elements comprises controllably providing power to the first heating element;
> wherein the method further comprises sensing first and second currents with the current sensor, the second current sensed after the first current, and
> wherein the act of detecting the failure comprises calculating first and second resistance values with the first and second currents, respectively, calculating a resistance rate change with the first and second resistance values, comparing the resistance rate change to a threshold resistance rate change, the threshold resistance rate change indicating scale buildup, and determining a failure for the first heating element if scale buildup occurs and zero or more other conditions exist.

Before proceeding further, please note that Applicant did not incorporate the subject matter of claim 31, from which original claim 43 depends, into claim 30. Also, Applicant amended the following typographical error in original claim 43, ". . . wherein

the act of detecting the failure comprises calculating first and second resistance values with the first and second ~~temperatures~~ currents . . .".

Claim 63, which is claim 42 rewritten in independent form, is repeated below for the Examiner's reference.

63. A method of controlling a storage-type water heater comprising
a water tank comprising an inner surface
a first electric-resistance heating element comprising a thermal surface disposed within the inner surface at a first location,
a second electric-resistance heating element comprising a thermal surface disposed within the inner surface at a second location, and
a control system to operate the first and second heating elements, wherein the control system comprises a first temperature sensor associated with the first heating element, the method comprising:
controllably providing power to the first and second heating elements to heat water stored in the water tank;
detecting the failure of one of the first and second heating elements;
if detecting the failure of one of the first and second heating elements and zero or more other conditions exist,
preventing power to the failed heating element; and
controllably providing power to the non-failed heating element to heat water stored in the water tank;
wherein the act of controllably providing power to the first and second heating elements comprises controllably providing power to the first heating element;
wherein the method further comprises sensing first and second temperatures with the first temperature sensor, the second temperature sensed after the first temperature, and
wherein the act of detecting the failure comprises calculating a temperature rise with the first and second temperatures, comparing the temperature rise to a threshold temperature rise, the threshold temperature rise indicating scale buildup, and determining a failure for the first heating element if scale buildup occurs and zero or more other conditions exist.

Before proceeding further, please note that Applicant amended the following typographical error in original claim 42, ". . . wherein the method further comprises sensing first and second temperatures with the first ~~heating element~~ temperature sensor, the second temperature sensed after the first temperature . . .".

Original claims 42 and 43 stood rejected under 35 U.S.C. § 103(a) as being unpatentable over USPN 5,808,277 (Dosani) in view of USPN 6,242,720 (Wilson). To

establish a *prima facie* case of obviousness, three basic criteria must be met. *M.P.E.P.* § 706.02(j) and 2143.

> First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be both found in the prior art, not in applicant's disclosure.

Id. Applicant contends that the Office's proposed combination for amended claim 30 and new 63 does not meet the *prima facie* case of obviousness.

First, amended claim 30 is directed to a method of controlling a storage-type water heater, the method comprising, among other things, calculating first and second resistance values with the first and second currents, respectively, calculating a resistance rate change with the first and second resistance values, comparing the resistance rate change to a threshold resistance rate change, the threshold resistance rate change indicating scale buildup, and determining a failure for the first heating element if scale buildup occurs and zero or more other conditions exist. Claim 63 is directed to a method of controlling a storage-type water heater, the method comprising, among other things, wherein the act of detecting the failure comprises calculating a temperature rise with the first and second temperatures, comparing the temperature rise to a threshold temperature rise, the threshold temperature rise indicating scale buildup, and determining a failure for the first heating element if scale buildup occurs and zero or more other conditions exist. Neither the Dosani nor the Wislon references disclose or suggest using the temperature or resistance to determine whether scale buildup occurs as recited in claims 30 and 63. Rather, the Dosani reference discloses a water heater having, among other things, a programmable thermostat to reduce bacterial proliferation to prevent Leionellosis. The Wilson reference discloses a water heater having, among other things, a control that assures that the upper electric-resistance heating element cannot be activated when the element is not submersed in water. Therefore, neither reference teaches or suggests every

limitation of claims 30 and 63 (i.e., the combination does not meet the third prong of the *prima facie* case of obviousness). Accordingly, claims 30 and 63 are allowable.

Applicant also asserts that the Office's proposed combination does not meet at least one of the other prongs of the *prima facie* case of obviousness. More specifically and as pointed out by the Examiner, the Dosani reference discloses, among other things, detecting whether an element has failed through the use of sensing current. The Wilson reference discloses, among other things, detecting whether an upper heating element is surrounded by water through the use of sensing temperature. The Office, then, appears to argue that it would be reasonable to simply combine the Dosani and Wilson references to result in the claimed invention. However, Applicant asserts, based only on the Dosani and Wilson references, it would not be reasonable to combine the references to expect success. Each reference is directed to a separate, unrelated issue, and each controller is designed to address its respective issue. It would be unreasonable to expect success to combine the two references based only on the teachings of the two references. Also, the mere fact that the references can be combined does not render the resultant combination obvious unless the prior art suggests the desirability of the combination. *M.P.E.P.* § 2143.01. "Determination of obviousness can not be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998). Accordingly, claims 30 and 63 are allowable.

Please note that Applicant amended claims 32-36 and 40 to correct antecedent basis errors in view of the incorporation of the subject matter of claim 43 into claim 30.

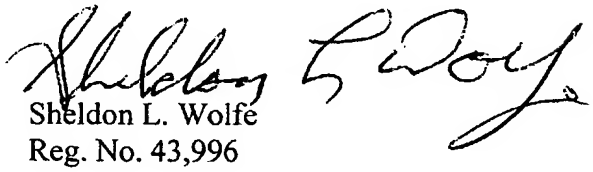
Claims 31-40, 54-62, and 64-73 depend, either directly or indirectly, from one of claims 30 and 63, and consequently, include patentable subject matter for the reasons set forth above with respect to claims 30 and 63 Accordingly, claims 31-40, 54-62, and 64-73 are allowable. In addition, Applicant assert claims 31-40, 54-62, and 64-73 include additional features that are believed to be allowable when combined with either claim 30 or 63.

In addition to the previous paragraph, Applicant traverses the rejection of claims 44-52, and 54-62 because the Office's reasoning is unclear.

CONCLUSION

Entry of the Amendment and allowance of claims 14, 15, 17-22, 30-40, and 44-73 are respectfully requested. The undersigned is available for telephone consultation at any time during normal business hours.

Respectfully submitted,



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